

RECOMMENDED PRACTICE

**FLANGE MOUNTED SHARP EDGED ORIFICE PLATES
FOR
FLOW MEASUREMENT**



Sponsor

INSTRUMENT SOCIETY of AMERICA
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Pittsburgh, Pennsylvania 15222

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FOREWORD

This Tentative Standard has been prepared as a part of the service of The Instrument Society of America toward a goal of uniformity in the field of instrumentation. To be of real value, this report should not be static, but should be subject to periodic review. Toward this end the Society welcomes all comments and suggestions, and asks that they be addressed to the Instrument Society of America, Standards and Practices Board Secretary, 530 William Penn Place, Pittsburgh, Pennsylvania 15219.

This report was prepared by the Committee on Fluid Meter Installation (8D-RP3).

C.A. Prior - Diamond Alkali Company (Chairman)
 R.L. Galley - Convair/Astronautics Division (Chairman 1951-1957)
 L.A. Dodge - Bailey Meter Company
 F.I. Ford - Hagan Chemicals & Control Company
 H.E. Schauss - Arthur G. McKee & Company
 C.E. Sharp - Minneapolis-Honeywell Regulator Company

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The following have reviewed the report and served as a Board of Review:

W.J. Christian - Barton Instrument Company
 R.H. Clemons, Jr. - Daniel Orifice Fitting Company
 L.N. Combs - E. I. du Pont de Nemours & Co., Inc.
 C.M. Cox - Phillips Petroleum Company (A.P.I.)
 L.P. Emerson - The Foxboro Company
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 E.C. Horton - Republic Flow Meters, Inc.
 E.B. Kretzmer - Esso Research and Engineering Company (A.P.I.)
 J.D. Muff - Robinson Orifice Fitting Company
 H.W. Stoll - Taylor Instrument Companies
 R.A. Tuck - Cities Service Oil Company (A.P.I.)
 E.L. Upp - Tennessee Gas Transmission Company

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1. PURPOSE

1.1 The purpose of this Standard is to establish:

- 1.1.1 Recommended materials.
- 1.1.2 Uniform symbols for dimensions.
- 1.1.3 Uniform dimensions.
- 1.1.4 Uniform tolerances.
- 1.1.5 Uniform identification practices.

2. SCOPE

2.1 This standard is intended to cover only orifice plates designed for bolting between flanges, with flat or raised face, whose bolting dimensions are in accordance with one of the following ASA standards:

B16b2
 B16.1
 B16b
 B16.5-1957

2.2 This standard is limited to pipe sizes 1 inch to 24 inches inclusive.

2.3 Orifice plates made in accordance with this Standard:

2.3.1 Satisfy all requirements of AGA Gas Measurement Committee Report No. 3, "Orifice Metering of Natural Gas"

2.3.2 Satisfy all requirements of the Report of ASME Research Committee on Fluid Meters, "Fluid Meters, Their Theory and Application." (Fifth Edition)

2.3.3 Satisfy all requirements of ASME Power Test Code, Supplement on Instruments and Apparatus, Part 5, Chapter 4 (PTC19.5;4-1959) except paragraph 20b. The Power Test Code is primarily concerned with precision measurements to meet the requirements for acceptance or guarantee tests.

2.3.4 May be used without limitations due to types of differential pressure taps.

2.4 This Standard does not:

- 2.4.1 Cover the details of calculating the bore of the orifice plate.
- 2.4.2 Cover flow calculations from data produced by an orifice plate.
- 2.4.3 Establish criteria and parameters for the proper use and installation of orifice plates.
- 2.4.4 Establish methods of fabricating or machining.



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3. DEFINITIONS

- 3.1 Concentric Orifice Plate - A circular disc having a concentric circular bore with a sharp 90° corner at the inlet face. (Figure - 3.2.1)
- 3.2 Eccentric Orifice Plate - A circular disc having an eccentric circular bore with a sharp 90° corner at the inlet face. (Figure - 3.2.2)
- 3.3 Segmental Orifice Plate - A circular disc with a bore which is a segment of a concentric circle and has a sharp 90° corner at the inlet face. (Figure - 3.2.3)
- 3.4 Drain or vent hole - A small circular opening in a concentric, eccentric or segmental orifice plate located so that it is approximately tangent to the inside diameter of the pipe in which it is installed. For concentric and segmental orifice plates it is at the top (vent) or the bottom (drain) as required by the service for which it is used. For an eccentric orifice plate it can be in any of three positions as required by the plate orientation in the installation.

4. CONSTRUCTION MATERIALS

- 4.1 Orifice plate materials shall be compatible with the flowing fluid.
- 4.2 Recommended materials for orifice plates are:
 - 4.2.1 Type 304 stainless steel (ASTM A167-54, grade 3)
 - 4.2.2 Type 316 stainless steel (ASTM A167-54, grade 11)
 - 4.2.3 Monel (ASTM B127-49T)

5. DIMENSIONS

- 5.1 Symbols for dimensions are defined by Figure - 3.2.1, Figure - 3.2.2, and Figure - 3.2.3.
- 5.2 Values are tabulated in Table I and Table II.
- 5.3 Finish - The inlet face shall be uniform and free of all scratches. The inlet face of:
 - 5.3.1 Stainless steel plates shall have a finish which is the equivalent of a standard commercial number 4 finish. This is a finish obtained by polishing the material with 120-150 mesh abrasive.
 - 5.3.2 Monel plates shall have a finish which is equivalent to International Nickel Company "Satin" finish. This is a finish which is produced by polishing the material with 180 mesh abrasive.

5.3.3 Plates made from other materials shall be of a smoothness comparable to cold-rolled steel with luster finish. This is a finish produced by rolling with polished rolls.

5.4 Flatness - The plate shall be considered flat when a true straight edge held against the inlet face of the plate in any position does not show a departure of more than one hundredth (0.010) of an inch per inch.

6. TOLERANCES

6.1 Maximum tolerance for dimension:

- 6.1.1 "A" and/or "C" is plus or minus 1/64 inch.
- 6.1.2 "B" is plus 1.0 inch, minus 0.
- 6.1.3 "d", "F" and/or "H" is shown in Table III.
- 6.1.4 "E" is plus or minus 0.004 inch
- 6.1.5 "G" is plus or minus 0.002 inch
- 6.1.6 "R" is plus 0.000, minus 1/16 inch
- 6.1.7 "T" is plus 0.000 or minus 0.010 inch ED
- 6.1.8 "W" is shown in Table I.
- 6.8.9 Bevel is $\pm 2^\circ$.

6.2 The inlet edge must be sharp and square so that it will not reflect a beam of light when viewed without magnification. Wire drawn or rounded edges must be avoided.

7. IDENTIFYING INFORMATION

- 7.1 The following items shall be permanently marked on the inlet face of the handle:
 - 7.1.1 Orifice Diameter, "d" - inches, (to nearest 0.001")
 - 7.1.2 Flange size and pressure rating - inches & PSIG
 - 7.1.3 "Inlet"
- 7.2 Additional information may be stamped on the outlet face of the handle.
- 7.3 The identifying information shall be located in the outer 3/4" of the handle to permit easy identification after installation.